



RELATIONSHIP BETWEEN HEIGHT, WEIGHT AND 1RM TO SHOT PUT PERFORMANCE IN YOUNG MALE ADULTS OF HILLY AREA

Dr. Amandeep Singh¹ | Vikesh Kumar²

¹ Assistant Professor Department of Physical Education, Guru Nanak Dev University, Amritsar, Punjab, India.

² Lecturer, Department of Youth Services and Sports, Jammu and Kashmir, India.

ABSTRACT

The purpose of the study was to find out the relationship between height, weight, and 1 RM to the shot put performance among school boys. To achieve the purpose of the study forty male subjects were selected from Govt. higher secondary school, Rabta, Jammu and Kashmir, the age group ranged between 17 to 21 years. All the subjects were physically active. The above selected variables were tested through height (stadio-meter), weight (weighing machine), and 1RM (bench press) respectively. Each subject was given three trials and the best performance was considered in the final score. The collected data was statistically analyzed with Pearson Product Moment correlation. The result of the study showed that there was a moderate positive correlation between weight and shot put performance, whereas a strong positive correlation was found between weight and shot put performance and 1RM and shot put performance. To test the hypothesis, the level of significance was set at 0.05.

KEYWORDS: Height, Weight, 1 RM, Shot put.

INTRODUCTION:

Strength is a fitness component i.e. it depends mainly on the energy liberation processes in the muscles. Strength is also perhaps the most important motor ability in sports as it is a direct product of muscle contractions. All movements in sports are caused by muscle contraction and, therefore, strength is a part and parcel of all motor abilities, technical skills and tactical actions. One-repetition maximum (one rep maximum or 1RM) in weight training is the maximum amount of force that can be generated in one maximal contraction. One repetition maximum can be used for determining an individual's maximum strength and is a key factor in determining the higher performance in events such as power lifting and weightlifting, shot put competitions. Teresa Mo, 2013 [1] Studied the general anthropometric characteristics of senior secondary school female shot put athletes in Hong Kong. Seventeen female shot putters took part in this study, and found that the mean height ($166.7\text{cm} \pm 3.97$), weight ($76.06\text{kg} \pm 15.16$) and BMI (27.33 ± 4.69) of the female shot putter were significantly higher than the mean height (158.6 ± 0.17), weight ($51.1\text{kg} \pm 0.12$) and BMI (20.4 ± 0.06) of average girls. There was a very weak relationship between the result of shot put and the anthropometric variables of the female shot putters. Patrick et al., 2011 [2] Correlation of Height and Preseason Bench Press 1RM to Shot Put and Weight Throw Performance during the Competitive Season. A significant correlation was found between indoor season shot put performance and the preseason variables height ($p = 0.025$) and bench press 1RM ($p = 0.039$). Yadav, Krishna R., 2014 [3] compare the Anthropometric characteristics, Body composition and Somatotyping in male High jumper ($N=10$) and Shot Put athletes ($N=10$). It is found that, in most of the parameters there were significant differences between high jump and shot put athletes. The shot put athletes showed better anthropometric measurements and somatotyping scores. Manesh Kumar 2016 [4] assessed the variables performance and to find out some of the most imperative kinematic defining the completion result in Glide shot-put technique. The result of the study indicates the possibility of increasing the horizontal length of the shot put, which would lead to greater distance. The release height and release velocities are inversely proportional. Ferenc Mizera 2002 [5] used computer modelling for typical release heights and optimal release angles; we compare the effect of Earth rotation on the range of the male hammer throw and shot put with that of air resistance, wind, air pressure and temperature, altitude and ground obliquity. M. Hubbard et al. 2000 [6] Horizontal release distance also decreases with increasing release angle at about 1.7 m/rad and increases with increasing release height at about 1.3 m/m, again with only small differences between the two throwers. Optimal release conditions producing maximum range for a particular athlete can be determined using similar constraints for that athlete. Nicholas P. Linthorne 2001 [7] each athlete had his own special optimum release angle because of individual differences in the rate of decrease in release speed with increasing release angle. Debbie A. Born 2004 [8] The significant correlations demonstrate relationships between 1RM and sport performance measures do exist and can be incorporated into a training program. National Strength and Conditioning Association's Testing and Evaluation Manual (2000) [9], the bench press is the test of choice by most strength coaches because it does not require expensive machinery and measures the strength necessary in sport activities. The Guidelines for Exercise Testing and Prescription Manual 1991 [10] indicates when using weight lifting exercises to assess strength, the bench press was a valid measure of general upper body strength. Mayhew et al. (1992) [11] performed a cross-validation study that included the college aged female population

($N=251$) and emphasized the accuracy of using relative muscular endurance tests for predicting 1RM strength. Basic physical characteristics for each subject were obtained prior to testing, which included height, weight and age. The relationship between percent 1RM and repetitions was exponential for both men and women. Actual 1RM should be used in conjunction with performing 12 or more repetitions. Pollock, Wilmore, and Fox 1978 [12] recommended a measure of 75% of the 1RM for exercises based on their research findings; additionally, individuals should be able to complete 12 to 15 repetitions using this percentage. Ball, Van Fleet, Lahey and Glass 1995 [13] also used the leg press to determine the relationship between maximal lifting capacity and relative muscular endurance. Chapman, Whitehead & Prinster, 1998 [14] The bench press is the most common exercise because it represents several major muscle groups used in the upper body including the chest, shoulders, triceps and biceps. Cummings & Finn, 1998 [15] conducted testing was performed to estimate a 1RM bench press for untrained women. The results from using 4 to 8 repetitions for testing evaluated by the Epley regression equation (1985) proved significant ($p < 0.001$) predictability in estimating 1RM strength in adult-aged untrained women. Gillespie et al. 1996 [16] chose the medicine ball in view of the fact that other research studies widely used the seated shot put and the medicine ball throw as reliable and economical field tests to determine upper body strength in a time consuming manner. The result revealed strong correlation between the distance of the medicine ball throw and the power index for the counter movement vertical jump.

MATERIALS AND METHODS:

40 male subjects were selected from Government Higher Secondary School, Rabta, Jammu And Kashmir randomly, the age group ranged between 17 to 21 years. All the subjects gave an informed consent after detailed protocol of the non-invasive technique was explained to them. Physical test of all subjects consists of measuring of height in meters, weight in kilograms and bench press was used to assess 1RM.

Study design:

The testing program starts with warm up exercises for 10 minutes (jogging, slow running, stretching exercises etc.) all the test were conducted in two days. First day testing programme includes- height measurement and shot put throw. In Second day –weight measurement and bench press for 1RM.

Height measurement

Equipment: stadiometer

The subjects were asked to stand erect, barefooted on a plane horizontal surface against a wall, with his heels, back of the shoulders and head touching the wall. He is requested to stretch the body upwards as much as possible without his heels leaving the ground. The head piece of the stadiometer or the sliding part of the measuring rod is lowered so that the hair (if present) is pressed.

Weight measurement

Equipment: weighing machine

The weight of subjects were measured (or calculated) by first weighing the same or similar clothing to that which will be worn during measurement and subtracting this from the measured scale mass. Check that the scale reading is zero, and then the subject stands on the centre of the scales without support and with the weight distributed evenly on both feet.

One Repetition Maximum (1-RM) Test

Equipment: barbell and weight plates

1RM is calculated by bench press measured using a free weight Olympic bar and plates. The initial weight for the 1-RM test was determined by each subject's training history. The subject grasps the bar at a position slightly greater than shoulder width. Spotters assist the subject in lifting the bar. The subject slowly lowers the bar touching the chest (without resting on the chest) and returns it to full arms length (Fleck & Kraemer, 1997). The subjects have to do maximum number of repetitions. And the 1RM is calculated with the following formula.

Epley formula: $1RM = w(1 + r/30)$

Shot put

Equipment: shot put (7.260 kg), measuring tape, nails

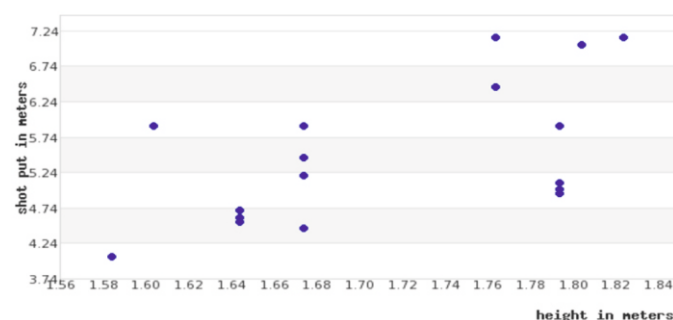
The demonstration of shot put given to the subjects, the instructions and rules of the shot put explained beforehand. Each subject was given three trials and the best performance was considered in the final score.

RESULTS:**TABLE-2 DESCRIPTIVE STATISTICS OF HEIGHT AND SHOTPUT PERFORMANCE**

Variables	Mean	S.D.	R
Height in meters	1.714	0.076	0.663
Shot put in meters	5.38	0.944	

*Significant at 0.05 level, Degree of freedom = 58

scatter plot of correlation between height and shot put performance

**Scatter plot 1.**

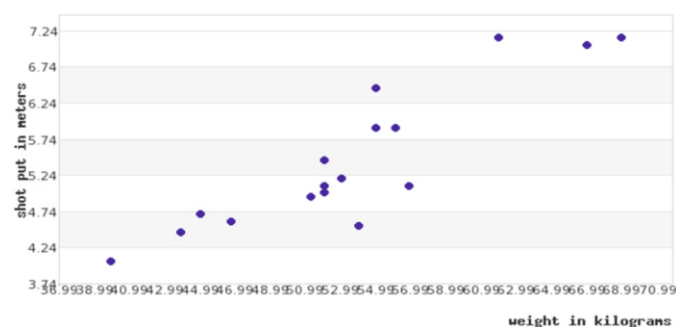
Scatter plot - 1 shows that the mean of the height and shot put is 1.714 and 5.38 respectively. Whereas standard deviation of the height and Shot put is 0.076 and 0.944 respectively, 'r' value is 0.663. The result reveals a moderate positive correlation between height and shot put performance.

TABLE-2 DESCRIPTIVE STATISTICS OF WEIGHT AND SHOTPUT PERFORMANCE

Variables	Mean	S.D.	R
Weight in kilograms	52.914	7.516	0.895
Shot put in meters	5.38	0.944	

*Significant at 0.05 level, Degree of freedom = 58

scatter plot of correlation between weight and shot put performance

**Scatter plot 2.**

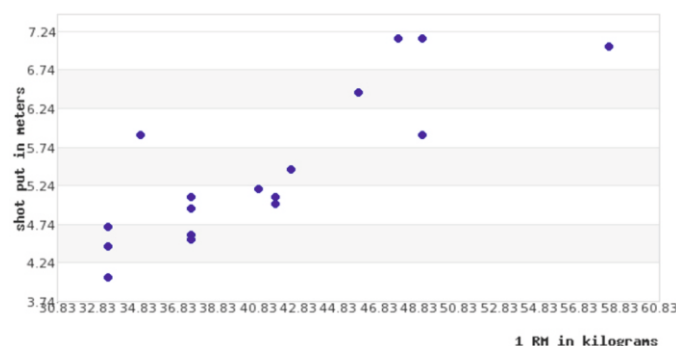
Scatter plot-2 shows that the mean of the weight and shot put is 52.914 and 5.38 respectively. Whereas standard deviation of the height and Shot put is 7.516 and 0.944 respectively, 'r' value is 0.895. The result reveals a strong positive correlation between weight and shot put performance.

TABLE-3 DESCRIPTIVE STATISTICS OF 1 RM AND SHOTPUT PERFORMANCE

Variables	Mean	S.D.	R
1RM IN kilograms	40.33	6.692	0.836
Shot put in meters	5.38	0.944	

*Significant at 0.05 level, Degree of freedom = 58

scatter plot of correlation between 1 RM and shot put performance

**Scatter plot 3.**

Scatter plot-3 shows that the mean of the 1 RM and shot put is 40.33 and 5.38 respectively. Whereas standard deviation of the 1 RM and Shot put is 6.692 and 0.944 respectively, 'r' value is 0.836. The result reveals a strong positive correlation between weight and shot put performance.

DISCUSSION:

We examined the relationship between height, weight and 1 RM to shot put performance in young male adults of hilly area, which consisted of various tests such as weighing of weight of subjects, height measurement and bench press. In current study, we found a moderate positive correlation between height and shot put performance, whereas a strong positive correlation was found between weight and shot put performance and 1RM and shot put performance. This result was similar to other previous studies [1, 2 and 10] correlation of height and pre-season bench press 1 RM to shot put performance during the competitive season. A significant correlation was found between indoor season shot put performance and preseason variables height ($p = 0.025$) and bench press 1 RM ($p = 0.039$). [13, 14] Variety of studies reveals that bench press is valid tool for assessment of upper body strength. [7] In additional to these studies various studies reveals that each athlete had his own special optimum release angle because of individual difference in the rate of decrease in release speed with increasing release angle.

CONCLUSION:

In conclusion, the intention of this study was to investigate relationship between height, weight and 1 RM to shot put performance in young male adults of hilly area. Because of the scarcity of research of fitness in hilly area, the result of this study is noteworthy. Boys of Higher Secondary School, Rabta, Jammu and Kashmir, India are a unique population that must have taken considerations when designing a fitness testing program that includes height, weight, 1 RM and shot put performance. Coaches and teachers who work with power sports of this age can evaluate shot put performance easily and effectively by the outcomes of this study. The significant correlation demonstration between height, weight, 1 RM and shot put performance. By using alternative measures of assessment, the coach and teacher can select the potential athlete. All of the equipment utilized in the study is readily available in most weight rooms and require little technical knowledge to accurately perform. The sports performance measures are common methods of evaluation found in general youth fitness tests, which most athletes are familiar with and comfortable performing.

REFERENCES:

1. Teresa. "Anthropometric characteristics of senior secondary school female shot put athletes in Hong kong." bachelor thesis Hong Kong Baptist University, 2013.
2. Patrick, T J; Bellar, D; Judge, L W; Craig, B., "Correlation of height and preseason bench press 1rm to shot put and weight throw performance during the competitive season." Journal of strength and conditioning research, 2011; vol25
3. Yadav, Krishna R., "A study of anthropometric measurements, body composition and somatotyping of high jump and shot put athletes." International Journal Physical Education, 2014, 7 (2): 67-70.
4. Manesh Kumar Murali M and Dr. Dhinu MR. "Kinematic analysis of shot release of intercollegiate athletes." International Journal of Physical Education, Sports and Health, 2016; 3(5): 131-134.
5. F. Mizera, G. Horvath "Influence of environmental factors on shot put and hammer throw range." Journal of Biomechanics, 2002, 35:785-796.
6. Mont Hubbard, Neville J. de Mestre, John Scott "Dependence of release variables in the shot put." Journal of Biomechanics, 2001, 34: 449-456.
7. Nicholas P. Linthorne "Optimum release angle in the shot put." Journal of Sports Sci-

ences, 2001, 19, 359-372.

8. Debbie A. Born "Performance measures and strength evaluation in the high school female athlete." A dissertation submitted to the graduate faculty of the University of Georgia in Partial Fulfillment of the Requirements for the Degree Doctor Of Education, 2004.
9. Pearson, D., Faigenbaum, A., Conley, M., & Kraemer, W. "The national strength and conditioning association's basic guidelines for the resistance training athletes." *Strength and Conditioning Journal*, 2000, 22 (4), 14-27.
10. Lee & Febiger. *Guidelines for exercise testing and prescription*. Philadelphia, PA. Lippincott Williams & Wilkins, Publishers, 1991.
11. Mayhew, J.L., J.R. Ware., & J.L. Prinster "Using lift repetitions to predict muscular strength in adolescent males." *National Strength and Conditioning Journal*, 1993, 15, 35-38.
12. Pollock, M.L., Wilmore, J.H., & Fox, S.M. (1978). *Health and fitness through physical activity*. New York, NY. Wiley Associates, Publishers.
13. Ball, T.E., C. Van Fleet., R.J Lahey, & Glass. "The relationship of relative muscular endurance to maximal lifting capacity in college men and women." *Journal of Strength and Conditioning Research*, 1995, 9, 277.
14. Chapman, P.P., Whitehead, J.R., & Brinkert, R.H. "Prediction of 1 RM bench press from the 225 lbs reps to fatigue test in college football players." *Journal of Strength and Conditioning Research*, 1998, 12 (4), 258-261.
15. Cummings, B., & Finn, K.J. "Estimation of a one repetition maximum bench press for untrained women." *Journal of Strength and Conditioning Research*, 1998, 12 (4), 262-265.
16. Gillespie, J., & Keenum, S. (1987). A validity and reliability analysis of the seated shot put as a test of power. *Journal of Human Movement Studies*, 13, 97-105.